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Calc Weekly Review 3 0910

1) Evaluate each of the following limits algebraically and discuss the continuity of the function including any points of discontinuity.

a) $\lim_{x \rightarrow 3^-} \frac{|x-3|}{x^2-9} \rightarrow \frac{x-3}{(x-3)(x+3)} \Rightarrow \lim_{x \rightarrow 3} \frac{1}{3+3} = \frac{1}{6}$

b) $\lim_{x \rightarrow \infty} \frac{x-2}{x^3+8}$

c) $\lim_{x \rightarrow 0} \frac{1-\cos(x)}{x^2} \cdot \frac{1+\cos x}{1+\cos x} \Rightarrow \frac{\sin^2 x}{x^2(1+\cos x)} \Rightarrow \lim_{x \rightarrow 0} \frac{\sin x}{x} \cdot \lim_{x \rightarrow 0} \frac{\sin x}{x} \cdot \lim_{x \rightarrow 0} \frac{1}{1+\cos x} = 1 \cdot 1 \cdot \frac{1}{2} = \left(\frac{1}{2}\right)$

d) $\lim_{x \rightarrow -2} 3x^2 + 5x - 2 = 0$

2) Write the equation of the line tangent to $f(x) = x + \cos x$ at $x = \frac{\pi}{2}$.

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4) Use the definition of derivative at a point (p. 100) to find $h'(2)$, if it exists, given that

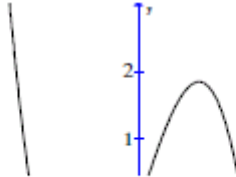
$$h(x) = \begin{cases} 4x^2 + 1, & x \geq 2 \\ 10x - 3, & x < 2 \end{cases}$$

show all work and fully justify your conclusions.

$$\lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$$

5) Match each graph to the graph of its derivative. Explain your reasoning and sketch both graphs in your answer.

a) 

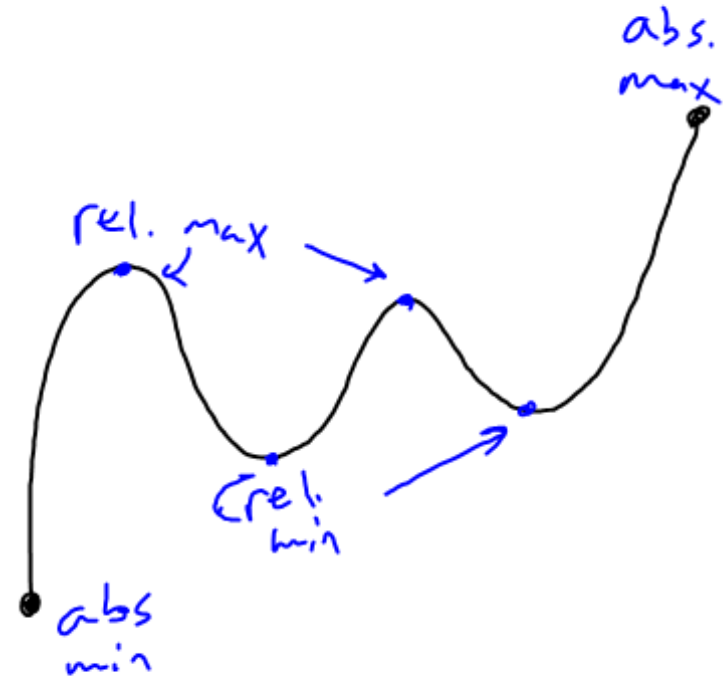
i) 

Global (absolute) extreme (max/min) \rightarrow ^{Smallest} biggest ever closed interval

Local (relative) extreme \rightarrow relative open interval

Critical Point $\leftarrow f'(x) = 0$
 $f'(x)$ = doesn't exist

- don't forget endpoints



$$y = x^2 \sqrt{3-x}$$

Find all critical points
and label as ^{abs. or relative}
max/min

Do Algebraically

$$y = x^2 \sqrt{3-x}$$

$$2x(\sqrt{3-x}) + x^2 \cdot \frac{1}{2} (3-x)^{-\frac{1}{2}} \cdot -1$$

$$y' = 2x(\sqrt{3-x}) + \frac{-\frac{x^2}{2}}{\sqrt{3-x}}$$

$$y' = x \left(\frac{2(\sqrt{3-x}) + \frac{-x}{2}}{\sqrt{3-x}} \right)$$

$$y' = x \left(\frac{2(\sqrt{3-x}) + \frac{-x}{2}}{\sqrt{3-x}} \right)$$

$$y' = x \left(\frac{(2\sqrt{3-x})^2 + \frac{-x}{2\sqrt{3-x}}}{2\sqrt{3-x}} \right) \quad \frac{2\sqrt{3-x}}{2\sqrt{3-x}}$$

$$y' = x \left(\frac{4(3-x) - x}{2\sqrt{3-x}} \right)$$

$$y' = x \left(\frac{12 - 4x - x}{2\sqrt{3-x}} \right)$$

$$y' = x \left(\frac{12 - 5x}{2\sqrt{3-x}} \right)$$

critical Points

$(0, 0) \rightarrow$ abs. min

$(\frac{12}{5}, 4.46) \rightarrow$ rel. max

$(3, 0) \rightarrow$ abs. min

$$\frac{2\sqrt{3-x}}{2\sqrt{3-x}}$$

$$x = 0, 2.4$$

- Turn in cl. 3 Review
- Sect. 4.1 # 8, 10, 16, 18, 19, 22, 23, 29, 30, 37, 40, 42
- Weekly Review #5